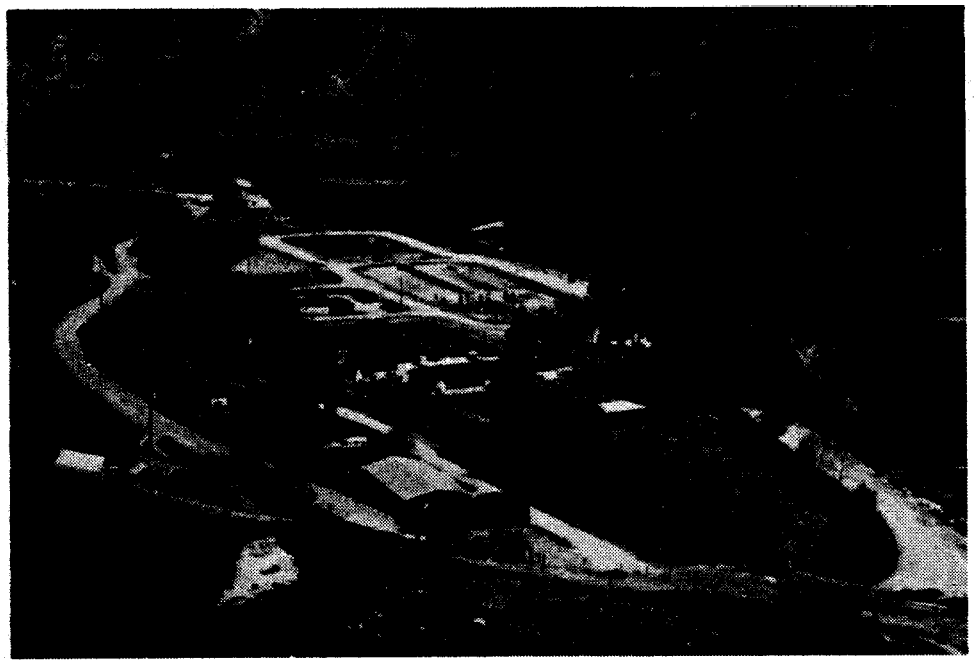
Article 17

Idaho Power

RAPID RIVER HATCHERY

1985 CHINOOK SALMON BROOD YEAR REPORT



By

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ABSTRACT

Operation of the adult trap began on April 13 and continued through September 11, 1985. Between May 10 and July 24 a total of 6,727 spring chinook were collected in the trap. This total was comprised of 6,376 adults and 351 jacks, with an age class breakdown of 5.2% three-year-olds, 91.8% four-year-olds, and 3.0% five-year-olds. Sex ratio of adult fish was 47.5% male and 52.5% female.

Prespawning mortality for Rapid River fish in 1985 was 7.75%. Autopsies performed on these fish revealed only 0.4% had obvious signs of bacterial kidney disease (BKD). Spawning operations began on August 13 and continued through September 17, 1985. A total of 2,962 females were spawned, yielding approximately 10,461,203 eggs, of which over 6.6 million were transferred to other projects. Survival to eye-up and swim-up was 81.2% and 95.9%, respectively.

A total of 4,673,915 swim-up fry were transferred to the raceways for early rearing. Mortality during this phase of rearing totaled 104,323 fry, or 2.2%. A total of 1,187,317 fry were planted into the Clearwater and Salmon River drainages.

In early June, 3.5 million fry were transferred to the final rearing ponds. Fish health was poor during this period, with mortality totaling 442,486 fish, or 12.7%.

Prior to smolt release, 316,722 fish received coded wire tags, and 125,923 fish were freeze branded for research purposes. Based on population estimates, a total of 2,939,400 smolts were released from Rapid River Hatchery in 1987, with 2,836,400 being released directly into Rapid River and 103,000 released into the Snake River below Hells Canyon Dam.

A total of 212,050 lbs. (96,386.3 kg) of feed was used to produce 131,622 lbs. (59,828.2 kg) of fish, for an overall feed conversion of 1.61:1. Total feed cost for the 1985 brood year was $145,036.50.

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INTRODUCTION

Rapid River Hatchery was constructed in 1964 by Idaho Power Company as compensation for losses of chinook salmon (Oncorhynchus tshawytscha) resulting from the construction of Brownlee, Oxbow, and Hells Canyon dams on the Snake River. This mitigation, as required by the Federal Energy Regulatory Commission, required that Idaho Power transplant this run of chinook from the Snake River to the Salmon River drainage and provide funds for the production of three million spring chinook smolts annually. These fish are for release into Rapid River and Snake River below Hells Canyon Dam.

LOCATION

Rapid River Hatchery is located in Idaho County approximately seven miles (11.2 km) southwest of the community of Riggins, Idaho, on Rapid River, a tributary to the Little Salmon River. Rapid River Hatchery is staffed and operated by the Idaho Department of Fish and Game (IDFG) and completely funded by Idaho Power Company.

OBJECTIVES

The objectives of Rapid River Hatchery are:

1. To produce three million spring chinook smolts at an average size of 15 to 20 per lb. (33.1 to 44.1 per kg) for release into Rapid River and the Snake River below Hells Canyon Dam.

2. To trap and spawn adult salmon returning to Rapid River.

3. To evaluate various strategies and techniques for rearing spring chinook salmon.

4. To collect eggs in excess of hatchery needs for distribution to other projects.

FISH REARING FACILITIES

The fish rearing facilities at Rapid River Hatchery consist of 48 double-stack Heath incubator trays, 12 outdoor concrete raceways (6 ft. x 90 ft.; 1.82 m x 27.3 m) and two earthen rearing ponds. One concrete adult holding pond (80 ft. x 25 ft.; 24.3 m x 7.6 m) and two earthen holding ponds provide space for holding up to 10,000 adult salmon for spawning. Capacities for each of these containers are presented in Table 1.

Table 1. Carrying capacity of all systems at Rapid River Hatchery.

Container	Volume	Carrying capacity
Heath Incubators	768 Trays	7.7 million eggs
Raceways	1,890 ft^3 ea.	430,000 fry ea.
Rearing Pond 1	64,000 ft^3	1.2 million smolts
Rearing Pond 2	96,000 ft^3	2.2 million smolts
Adult Pond 1	21,000 ft^3	3,000 adults
Adult Pond 2	70,000 ft^3	6,000 adults
Cement Pond	12,000 ft^3	1,000 adults

The adult trapping facility, located on Rapid River approximately 1.5 miles (2.4 km) downstream from the hatchery, is equipped with a permanent wooden velocity barrier, a three-step fish ladder, and a two-stage trap. Adult salmon are transferred from the trap to a 1,000-gallon tank truck by means of an Alaska steep pass ladder and a 500-gallon bucket operated by an overhead hoist and transported to the hatchery.

WATER SUPPLY

From its origin in Adams County, Rapid River flows through a pristine canyon before reaching the hatchery. Under inclusion in the Wild and Scenic Rivers Act, the Rapid River drainage has not been subjected to perturbations such as logging and roading, and consequently, provides an excellent water source for rearing chinook. Water quality analysis (Table 2) was conducted monthly by hatchery personnel and fell within the suggested range for optimal fish health as described by Piper et al. (1982).

Water for hatchery operation is obtained from Rapid River through one 30 in. (76.2 cm) and one 26 in. (66 cm) pipeline. A 5 ft. (1.5 m) wooden diversion dam provides the necessary hydraulic head to supply the hatchery with approximately 30 cubic feet per second (cfs) of water. Except for the incubators, all systems operate on gravitational flow. Water for the incubation system is pumped from the headrace by one of two 7.5 hp electric pumps. A gasoline-operated pump and a filter bed system provide backup water should the electric pumps fail.

STAFFING

The permanent hatchery staff consists of a Hatchery Superintendent III, a Hatchery Superintendent I, and a Fish Culturist. In addition to the permanent staff, funding is provided for one eight-month and three three-month seasonal employees. Housing accommodations include three residences for the permanent staff and a mobile home for seasonal employees. Permanent staff members during this report period included: Tom Levendofske (Supt. III), Paul Abbott (Supt. I), Gary Bertellotti (Fish Culturist), and Rick Lowell (Fish Culturist).

FISH PRODUCTION

Adult Collection

Operation of the adult trap began on April 13 and continued through September 11, 1985. A total of 6,727 spring chinook were collected between May 10 and July 24. A bimodal distribution was observed in the timing of this year's run. The first peak occurred during the week of May 16-23, followed by a larger peak during the week

Table 2. Comparison of observed and suggested water quality parameters.

Parameter	Suggested range	Observed level
Alkalinity as $CaCO_3$	10 - 400	62.0
Dissolved Oxygen	5.0 - saturation	13.0
Ammonia (NH_3)	<0.0125	0.003
pH	6.5 - 8.0	7.3
Total Hardness as $CaCO_3$	10 - 400	74.0

of June 16-23 (Fig. 1). Age class determination based on length frequency data (Fig. 2) indicates the run was composed of 5.2% (351) three-year-olds, 91.81 (6,177) four-year-olds, and 3.0% (199) five-year-olds. Sex ratio of adult fish was 47.5% (3,030) male and 52.5% (3,346) female.

Nearly 181 of the adult chinook collected this season were injured prior to arrival at the trap. While the majority (467 or 38%) of these injuries were emboli, apparently resulting from gas supersaturation, a number of gill net scars (289 or 23%) and gaff wounds (104 or 8%) were also observed.

A total of 24 coded wire tags (CWT) were recovered from fish in 1985. Some of these returns were associated with a vibrio vaccination program conducted on 1979 and 1980 brood presmolts, and the results are currently under investigation. The balance of the tag returns involved an investigation of outmigration success in Hells Canyon.

Inventory of Miscellaneous Species

Other species trapped incidental to spring chinook include adult summer chinook, adult steelhead trout (Salmo gairdneri), bull trout (Salvelinus confluentus), rainbow trout (Salmo gairdneri), cutthroat trout (Salmo clarki), whitefish (Prosopium williamsoni), and a rainbow x cutthroat hybrid (Table 3). All of these fish were returned to Rapid River.

Holding and Spawning

To reduce prespawning mortality due to bacterial kidney disease, all fish were given a single subcutaneous injection of erythromycin phosphate (2.2 mg per kg body weight), and injuries were treated with a direct application of a fungicide prior to transfer to the holding pond. To control fungal development and further reduce prespawning mortality, fish were treated with a fungicide three times per week throughout the holding period.

Prespawning mortality for Rapid River fish in 1985 was 7.75% (App. I). Autopsies performed on these fish revealed only 0.4% to have obvious signs of bacterial kidney disease (BKD). Prespawning mortality in the Hells Canyon group was 17.8%, with only 2.0% being attributed to BKD.

Spawning operations began on August 13 and continued through September 15, 1985. Eggs were taken dry, and ovarian fluid removed to reduce the potential for vertical disease transmission. Sperm was also collected dry and pooled prior to fertilization. A total of 2,962 females were spawned, yielding approximately 10,461,203 eggs. Average fecundity was 3,532 eggs per female. All eggs were water hardened in a 75 ppm solution of Argentyne for one-half hour before transfer to the incubators.

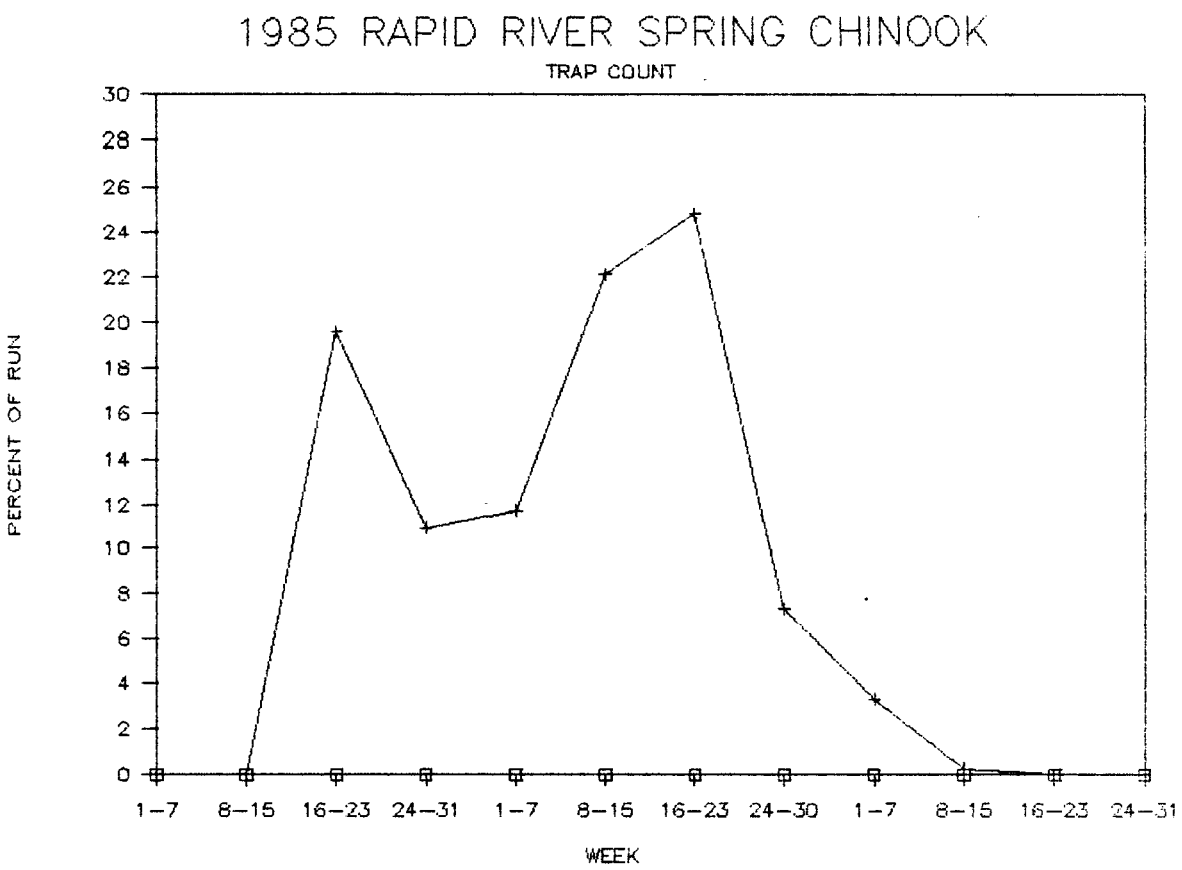

Figure 1. Timing of adult returns, 1985.

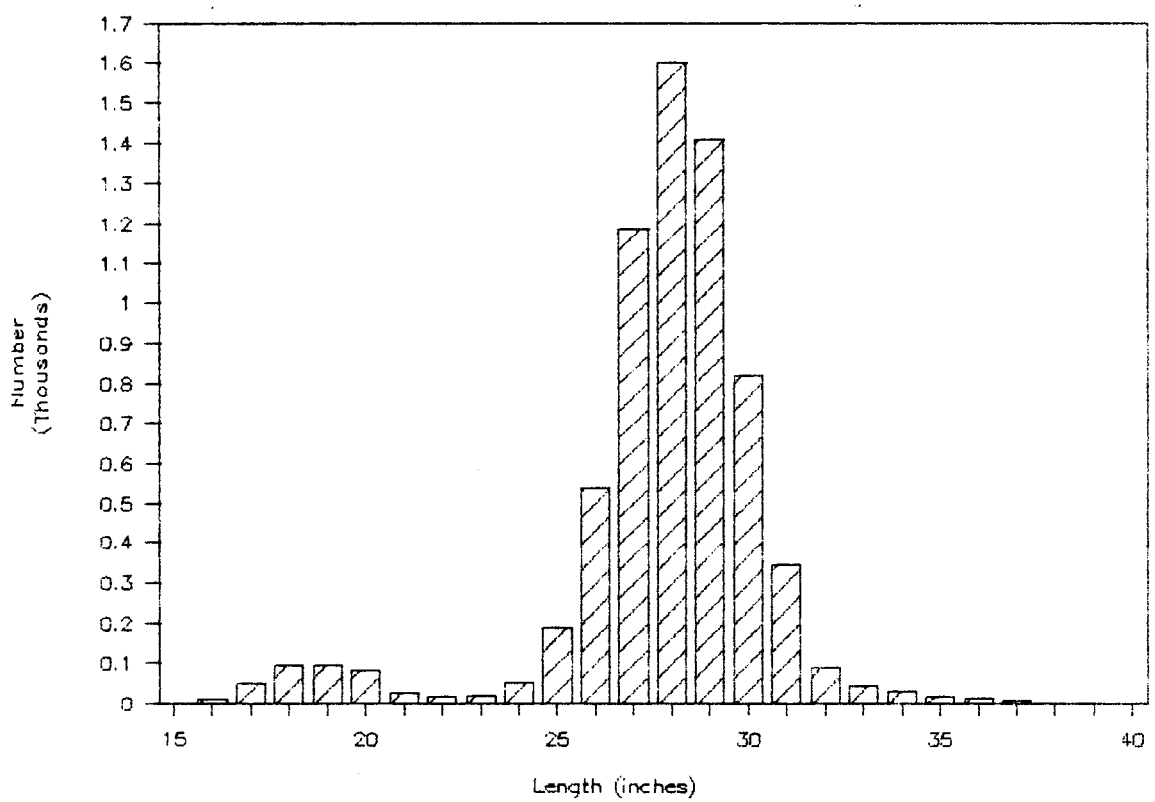

Figure 2. Length frequency of adult returns, 1985.

Table 3. Fish collection incidental to spring chinook.

Species	Number trapped	Dates
Summer chinook	1,097 adults, 172 jacks	6-28 thru 9-11
Steelhead	100	4-19 thru 6-11
Bull trout	153	5-1 thru 9-5
Rainbow	14	5-1 and 7-19
Cutthroat	3	5-1
Rainbow x cutthroat	1	9-5
Whitefish	3	6-21, 6-24, 8-8

A total of 268 Hells Canyon fish were spawned, yielding 1,074,258 eggs. The average number of eggs per female was 4,008. All of these eggs were incubated at Rapid River Hatchery. Nine Hells Canyon fish were destroyed due to signs of BKD.

Due to the large run this year, eggs were available for distribution to other projects. Total egg take and distribution figures are presented in Table 4.

A total of 60 salvageable chinook carcasses were given to the Shoshone-Bannock Indian Tribes. With the exception of 1,300 carcasses which were buried, all unsalvageable carcasses were frozen and shipped to Idaho Animal Byproducts Company of Nampa, Idaho.

Incubation

After water hardening in Argentyne, eggs were sized using a 6 in. (15.24 cm) VonBayer trough and placed in Heath incubator trays. Loading density was approximately 80 fluid ounces (2,365.6 ml) per tray.

Beginning on the fourth day of incubation, all egg lots were treated with formalin to control fungal invasion. Treatments were administered three times per week at a 1:600 concentration for 15 minutes and continued until each lot accumulated 800 daily temperature units (TU).

Eye-up occurred at approximately 500 TUs, at which time all eggs were shocked and picked using the salt flotation method. Egg size was redetermined at this time using volumetric displacement, and the eggs were returned to the incubator trays. Survival to eye-up ranged from 75.5% to 95.5%, with an overall average of 81.21. Hatching occurred at approximately 1,000 TUs, and swim-up fry were transferred to the raceways at 1,648 to 1,715 TUs. Survival from eye-up to swim-up averaged 95.9%.

Early Rearing

During the period January 28 through March 19, a total of 4,673,915 swim-up fry were transferred to the raceways. Average size at the time of transfer was 1,379 per lb. (3,040 per kg). Loading densities ranged from 418,196 to 860,704 fish per raceway, with an initial water depth of 1.5 ft. (.46 m) and inflow of 0.9 cfs. As fish size increased, water depth and inflow were adjusted up to a maximum of depth of 3 ft. (.91 m) and 1.5 cfs flow to maintain density and flow indices at or below 0.5 and 1.5, respectively, as suggested by Piper et al. (1982).

Table 4. Total egg take and distribution, Rapid River fish, 1985.

Receiving agency	Number females	Number green	Eyed eggs
Oregon	128	497,520	
Dworshak	966	3,668,000	
Sawtooth	203	760,248	1,690,659
Rapid River	1,665	4,919,034*	
TOTAL:	2,962	9,844,802	1,690,659

*Includes Hells Canyon eggs.

All fish were fed Oregon Moist Pellet Formula IV diet (OP-IV) during the early rearing period. Feed was delivered using Allen automatic feeders, with supplemental hand feeding done on an hourly basis. Fry were started on OMP starter mash at 2.5% body weight, with feed size increasing to 1/32 in. when fish weighed 800 per lb. and 3/64 in. when they reached 500 per lb. As pellet size and water temperature increased, feeding rates were increased up to 4% body weight. Pound counts were taken on two-week intervals and feed amounts adjusted accordingly. Growth rates during this phase of rearing were very close to the projected rates (Fig. 3), and mortality totaled 104,323 fry, or 2.2%.

Final Rearing

By June 12, the transfer of fry to the earthen rearing ponds was completed. Mean size at this time was 345.72 fish per lb. (455.25 per kg). Initial pond loadings are presented in Table 5.

All fish were fed OMP Formula II during the final rearing period. Initially, 1/16 in. pellet size was used, with feed size increasing to 3/32 in. at 150 per lb. and 1/8 in. at 50 per lb. Feed rates ranged from 1.4 to 3.0% body weight. The higher rates were fed in early summer and later reduced to decrease the possibility of getting bacterial gill disease (BGD) associated with higher water temperatures. This procedure appeared to work as essentially no fish were lost to BGD. Pound counts were taken on two-week intervals and feed volumes adjusted accordingly. As water temperature decreased in September, feed rates were further reduced until a rate of less than 1.0% was fed during December and January.

Fish health problems during this period (see Fish Health) are reflected in inconsistent growth rates (Fig. 4). Total mortality during this period was 442,486 fish, or 12.7%.

Fish Health

Fish health during the early rearing period, except for initial moving stress mortality, was very good (Fig. 5). Routine necropsies conducted by hatchery personnel and Pat Chapman (IDFG Pathologist) turned up no significant abnormalities. During this time, prophylactic treatments were administered every two weeks using benzalkonium chloride at 2 ppm for one hour.

At times, fish health during the final rearing period was poor, as some fish contracted bacterial kidney disease (BKD) and peduncle disease. BKD was diagnosed in both rearing ponds on July 15. In response, a 21-day treatment using medicated feed containing erythromycin phosphate was administered. Feed rates were calculated to provide 4.5 g of Gallimycin-50 (active ingredient) per 100 lbs. (45.3 kg) of fish per day. The treatment worked, as mortality stayed low for the remainder of the month.

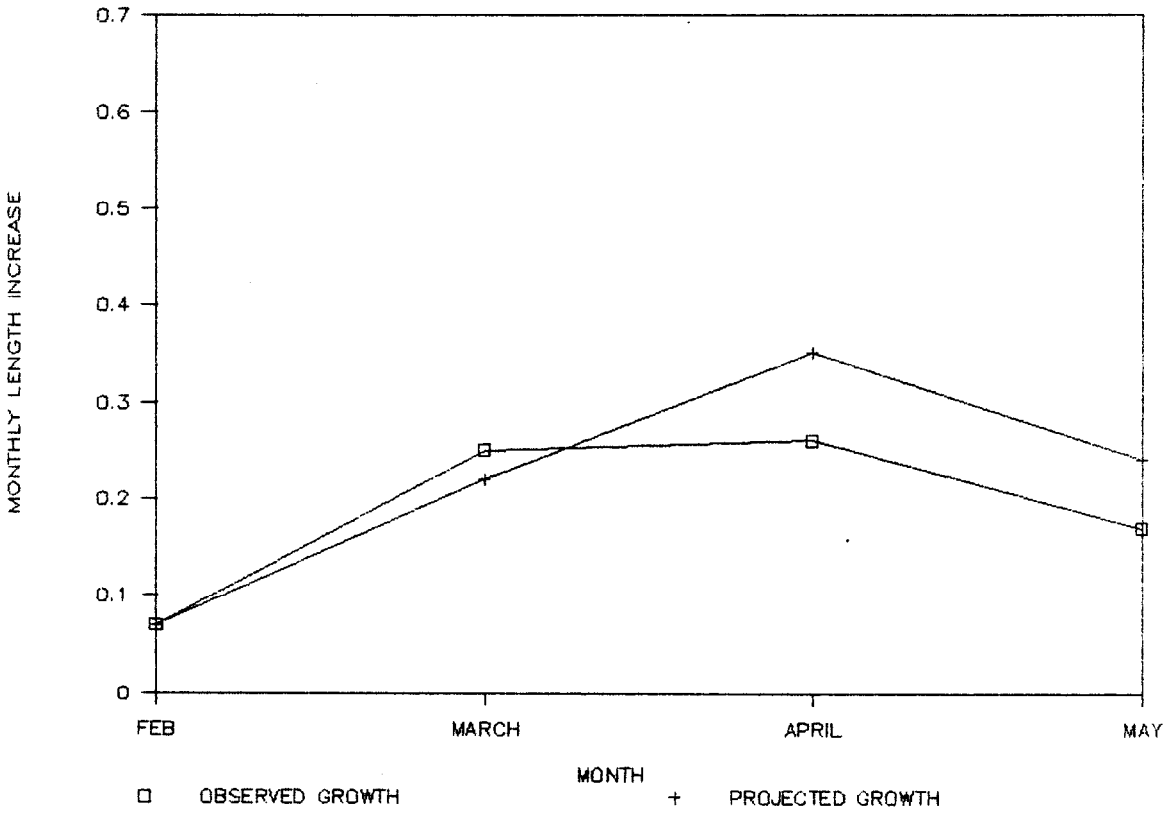

Figure 3. Observed and projected growth during early rearing.

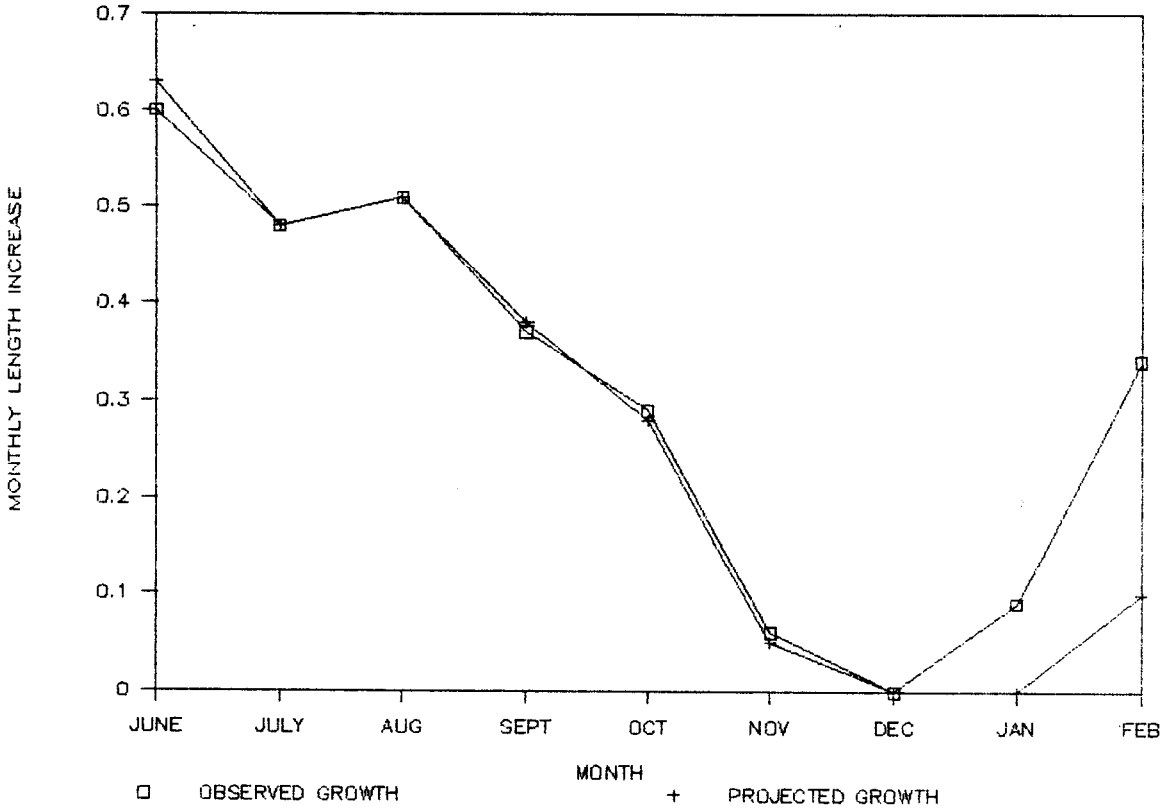

Figure 4. Observed and projected growth during final rearing.

Table 5. Initial pond loading densities, June 1986.

Pond	Inflow	Millions of fish	Size per pound	Flow index	Density index
1	13 cfs	1.29	328.1	.34	.03
2A	7 cfs	0.65	324.2	.26	.04
2B	7 cfs	0.45	368.2	.16	.02
2C	7 cfs	0.45	431.0	.27	.03
2D	7 cfs	0.65	327.6	.27	.04

During mid-August, hatchery personnel began observing several fish with symptoms of coldwater disease (necrotic tissue and fungal infections on the caudal peduncle); however, no -bacteria were found. Therefore, weekly treatments with malachite green were given at 1 ppm for one hour and continued through mid-October. In addition to the malachite treatments, fish were also fed medicated feed containing TM-50 at a rate of 2% body weight. These treatments proved to be effective in reducing mortality (Fig. 6). In November, coldwater disease symptoms reappeared, and mortality began to increase again (Fig. 6). As a result of new federal regulations, use of malachite green was terminated. Therefore, treatments using benzalkonium chloride (BC) were administered at 3 ppm for one hour over a three-day period, but mortality continued to escalate (over 3,000 per day). Examinations performed at this time could not verify the presence of Cytophaga psychrophilia, the bacteria that causes coldwater disease. At this time, it was suggested that the name of this disease be changed to peduncle disease. Total mortality from peduncle disease was estimated at over 300,000 fish, or about 10% of the inventory.

Other factors that may have influenced the increased mortality include a possible nutritional problem, poor water quality during this period due to otters invading the ponds and creating a turbid environment, and decreasing water temperatures.

Prior to release, smolts from both rearing ponds were sampled for bacterial and viral pathogens and underwent smolt quality assessment. Test results for all pathogens were negative, except for Renibacterium salmoninarum (Table 6).

FISH DISTRIBUTION

Fish Marking

In November of 1986, a portion of the 1985 brood year fish was marked in accordance with an agreement recently developed between the United States and Canada in which selected stocks of Idaho fish will be used as indicators of Idaho's contribution to ocean harvest. Rapid River is one of these selected stocks, and a large group of fish received a CWT and adipose fin clip for identification. In addition, two groups of fish were freeze branded for evaluation of outmigration timing and survival. Approximately 13,000 fish received a PIT tag. The objective of this study was to estimate the survival of juvenile yearling chinook salmon traversing Lower Granite Pool. These fish were held in a separate net pen until transfer. All other fish were returned to the rearing ponds and released in conjunction with the normal hatchery production. A summary of marked groups is presented in Table 7.

Table 6. Results of disease inspection of Rapid River presmolts.

Pathogen	Sample Size	Results
IHN virus	30 kidney/spleens, each pond	-
IPN virus	30 kidney/spleens, each pond	-
EN virus	20 blood smears, pond 1; 10 pond 2	-
Other viruses	30 kidney/spleens, each pond	-
Yersinia ruckeri	25 intestine streaks, each pond	-
Aeromonas salmonicida	25 intestine streaks, each pond	-
Renibacterium salmoninarum	30 kidney imprints pond 1; 36 pond 2	+

Table 7. Summary of marked fish released from Rapid River, 1987.

Mark	Number marked	Size	Release group	Date released	Location
LDR-4	62,280	32/lb	103,000	3-23/87	Snake R.
LDR-2	63,643*	35/lb	1,219,875	4-4/87	Rapid R.
CWT	316,722	35/lb	1.219,875	4-4/87	Rapid R.
PIT	2,997	27/lb	103,000	3-23/87	Snake R.
PIT	10,150	27/lb	8,590	3-27 to 4-5/87	Snake R.

*These fish also received CWT.

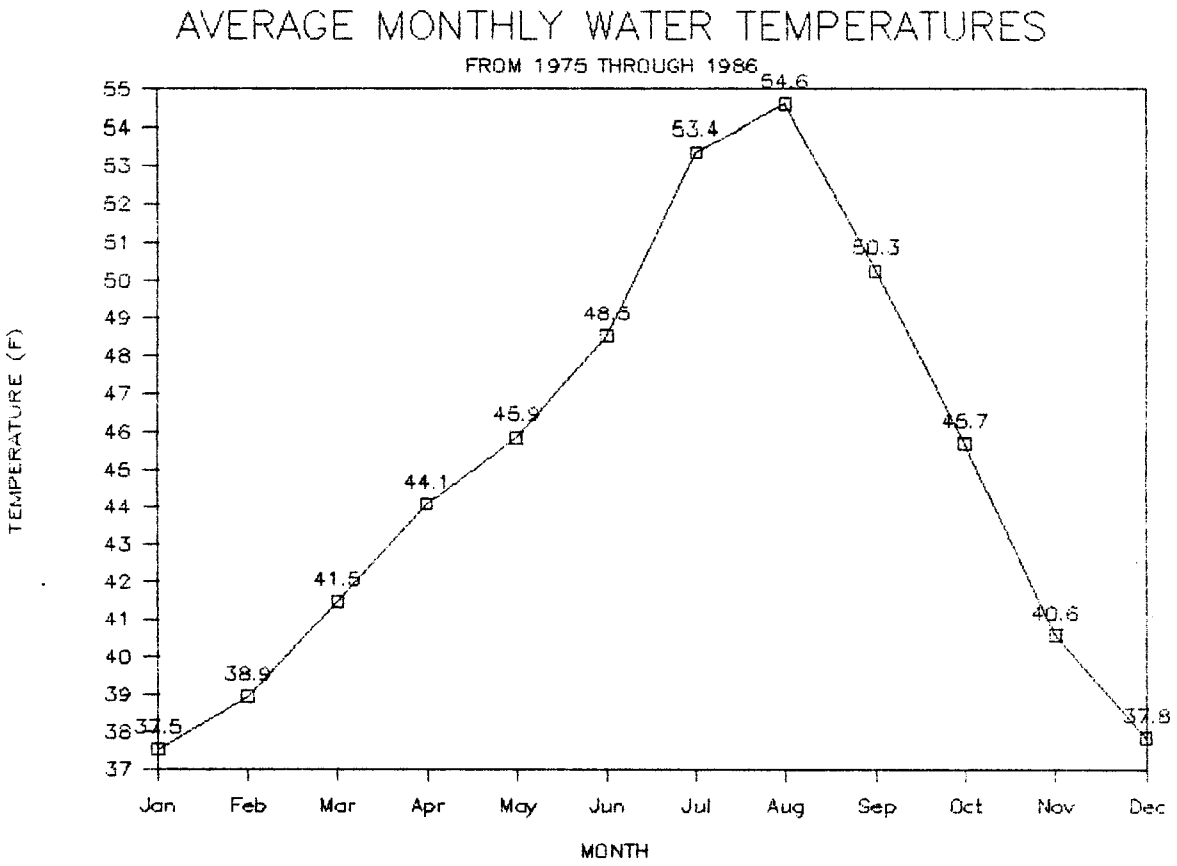

Figure 5. Average monthly water temperatures.

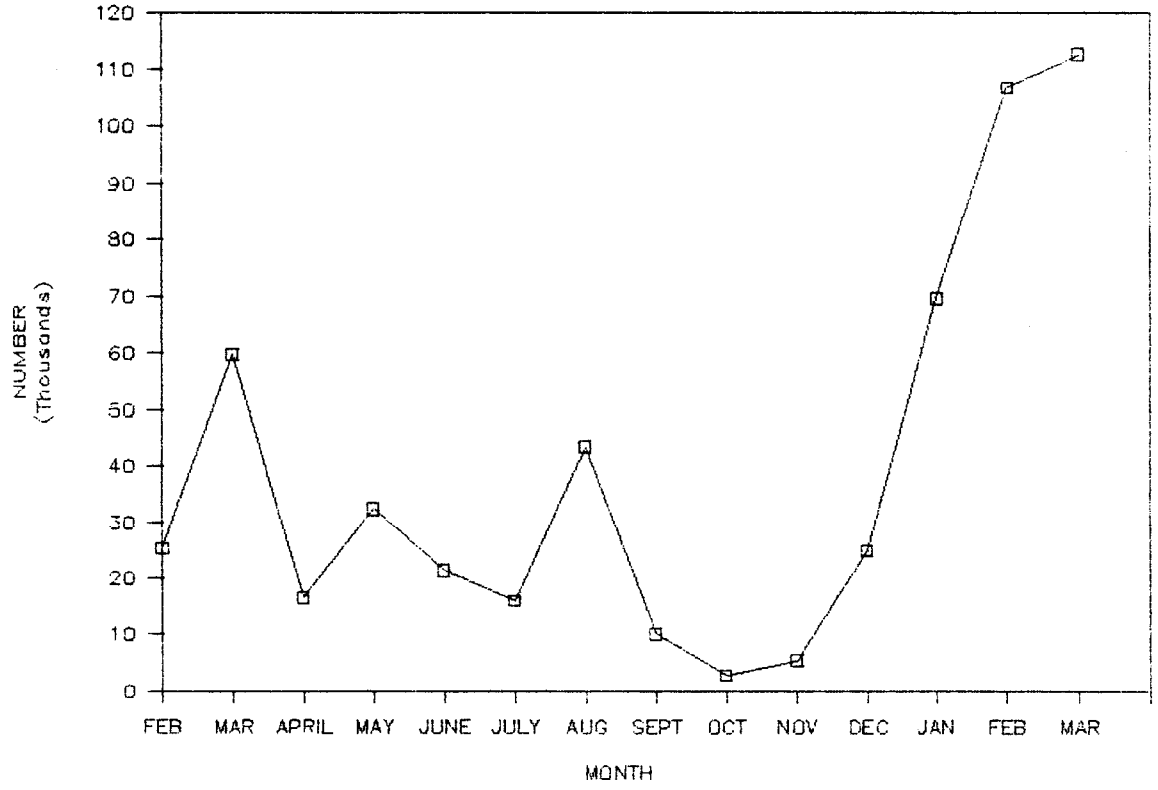

Figure 6. Monthly mortality of BY 1985 fish.

Fingerling Release

Between April 23 and May 8, 1986, a total of 1,187,317 fry were planted into the Clearwater and Salmon River drainages. These fish ranged in size from 165 to 712 fish per lb. and were distributed by helicopter to the various streams.

Smolt Release

By utilizing the CWT fish as a mark group, it was possible to estimate the total fish inventory at Rapid River Hatchery prior to release by using a Lincoln-Peterson population estimate. Based on the results of this estimate, a total of 2,939,400 smolts were released from Rapid River Hatchery in 1987. This total included 2,836,400 smolts released directly into Rapid River and 103,000 smolts released into the Snake River below Hells Canyon Dam. Smolts released directly into Rapid River averaged 22.5 per lb. (49.5 per kg) and 4.74 in. (120.4 mm) fork length, while smolts released into the Snake River averaged 31.1 per lb. (68.4 per kg) and 4.46 in. (113 mm) fork length.

FEED USE

A total of 212,050 lbs. (96,386.3 kg) of feed was used to produce 131,622 lbs. (59,828.2 kg) of fish this brood year. This resulted in an overall feed conversion of 1.61:1. Total feed cost for production of 1985 brood smolts was $145,036.5, or $1.10 per lb. ($2.42 per kg) of fish produced.

RECOMMENDATIONS

Fish Production

During the 1986 brood year, special attention will continue to be given to the use of a hatchery constant for calculation of feeding rates as well as a comparison of the dietary efficiency of Moore-Clark and BioProducts. We hope that research in these two areas will allow us to increase feed conversion as well as the quality of the smolts produced.

Facility Improvements

Numerous improvements have been made in recent years to upgrade and improve hatchery operations. Consideration should be given to the following list of recommendations to further improve the overall operation of Rapid River Hatchery.

1. Reconstruct the adult holding and spawning facilities to include concrete holding ponds and mechanical crowders.

2. Construct concrete walls on the outside of Pond 2 to decrease the amount of "dead space," thereby increasing turnover rate and creating a more workable, efficient system.

3. Resurface the roadway leading to Rapid River Hatchery and the parking lot.

4. Install power-driven drum screens on the rearing pond outlets to facilitate leaf and algae removal.
5. Construct a visitor center and improve all hatchery signs.

6. Provide additional shrubs and ground cover in the hatchery park.

7. Construct a new sewage treatment system.

8. Construct a sand/silt settling basin for water intake system.

9. Reconstruct the water intake system at the trap facility.

10. Install a mobile freezer to facilitate handling of adult chinook carcasses.
11. Reconstruct piping, etc., for improved effluent settling.

12. Replace all raceway feeders.

13. Modify the smolt collection basin to facilitate smolt loading.

14. Design and install a fungus treatment system for adult chinook.

ACKNOWLEDGEMENTS

The crew at Rapid River Hatchery would like to express their appreciation to Mr. Larry Wimer of Idaho Power Company and his staff for their continued support and assistance. The crew would also like to thank the coded-wire tagging crew and enforcement personnel from Region 2 who provided assistance throughout the year. We also appreciate the extra help from other hatcheries during the spawning season.

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Piper, R.G., I.B. McElwain, L.O. Orme, J.P. McCraren, L.G. Fowler, and J.R. Leonard. 1982. Fish Hatchery Management. USDI Fish and Wildlife Service, Washington, D.C.

APPENDICES

Appendix I. Returns of spring chinook salmon to Rapid River Hatchery, survival to spawning, and enumeration of eggs, 1964-1985.

Return year	Snake R. returns (adults)	Rapid R. returns (adults)	Rapid R. returns (jacks)	Prespawning mortality percentage	Number of females spawned	Number of eggs per female	Number of eggs taken
1964	349			16%	182	4,874	887,000
1965	408			21%	133	4,541	604,000
1966	1,511			18%	621	3,697	2,296,000
1967	974		1,039	11%	581	3,537	2,055,000
1968	351	3,416	740	2%	1,809	3,671	6,540,000
1969	672	2,817	1,043	8X	1,415	3,655	5,151,697
1970		6,470	887	10%	3,520	4,136	14,560,280
1971		3,357	1,754	19X	1,722	3,507	6,038,785
1972		12,310	943	15X	3,825	3,941	15,072,604
1973		17,054	286	37X	3,454	3,912	13,510,465
1974		3,457	538	27%	1,756	3,924	6,890,186
1975		4,428	573	7X	2,184	3,894	8,503,606
1976		6,342	1,765	15%	3,055	3,762	11,492,878
1977		7,767	437	11%	3,781	3,745	14,160,330
1978		5,735	34	21%	2,350	4,266	10,026,888
1979		3,054	350	31%	1,141	4,950	5,648,722
1980		1,528	432	30%	543	3,235	1,756,827
1981		3,087	176	7X	1,666	3,675	6,122,273
1982		3,646	30	11%	1,883	3,973	7,482,330
1983		1,864	94	15X	859	4,015	3,449,471
1984		1,705	651	7X	821	3,807	3,125,911
1985		6,376	351	8X	2,962	3,741	11,082,369*

*Volumetric displacement method total = 11,535.461.

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Appendix II. Summary of spring chinook adults to Rapid River by brood year.

Brood year	Year released	Number released	3-yr olds	Year returned	4-yr olds	Year returned	5-yr olds	Year. returned	Total brood year return	Z return from plant
1964	1966	588,000	1,039	1967	.3,422	1968	197	1969	4,658	0.80
1965	1967	479,267	740	1968	2,620	1969	874	1970	4,234	0.89
1966	1968	1,460,150	1,043	1969	5,596	1970	364	1971	7,003	0.48
1967	1969	900,192	887	1970	2,992	1971	1,544	1972	5,416	0.60
1968	1970	3,172,000	1,754	1971	10,766	1972	4,403	1973	16,923	0.53
1969	1971	2,718,720	943	1972	12,654	1973	1,759	1974	15,356	0.56
1970	1972	2,809,200	285	1973	1,698	1974	386	1975	2,370	0.08
1971	1973	2,908,425	538	1974	4,206	1975	1,120	1976	5,864	0.20
1972	1974	2,707,917	573	1975	5,222	1976	634	1977	6,429	0.24
1973	1975	3,373,700	1,765	1976	7,110	1977	1,845	1978	10,720	0.32
1974	1976	3,358,940	437	1977	3,890	1978	2,413	1979	6,740	0.20
1975	1977	2,921,172	34	1978	598	1979	46	1980	678	0.02
1976	1978	2,413,678	350	1979	1,482	1980	146	1981	1,978	0.08
1977	1979	2,866,993	432	1980	3,068	1981	557	1982	4,057	0.14
1978	1980	2,604,823	176	1981	3,089	1982	1,026	1983	4,291	0.16
1979	1981	2,372,607	30	1982	838	1983	356	1984	1,224	0.05
1980	1982	1,473,733	94	1983	1,349	1984	199	1985	1,642	0.11
1981	1983	2,998,103	651	1984	6,177	1985	1,456	1986	8,284	0.28
1982	1984	3,246,197	351	1985	5,090	1986		1987		
1983	1985	2,491,238	177	1986						
	1986	1,594,688								
	1987	2,836,400								

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